

**WHAT IS CLAIMED IS:**

1           1.     A method of detecting information embedded in an image, comprising:  
2           for each of two or more different halftone modulations, applying a respective  
3 filter to the image to identify an ordered sequence of halftone modulations embedded  
4 in the image.

1           2.     The method of claim 1, wherein each halftone modulation is generated  
2 from a respective dither matrix.

1           3.     The method of claim 1, wherein each filter corresponds to a matched  
2 filter for a respective halftone modulation.

1           4.     The method of claim 1, wherein applying a respective filter to the  
2 image comprises convolving the filter with the image.

1           5.     The method of claim 4, further comprising generating a score map for  
2 each halftone modulation based upon the convolution of the corresponding filter and  
3 the image.

1           6.     The method of claim 5, further comprising identifying halftone  
2 modulations embedded in regions of the image based upon the generated score  
3 maps.

1           7.     The method of claim 6, further comprising selecting one halftone  
2 modulation as corresponding to an image region to which multiple halftone  
3 modulations are identified based upon the generated score maps.

1           8.     The method of claim 6, wherein halftone modulations are identified in  
2 the image based upon a threshold applied to the score maps.

1           9.     The method of claim 8, further comprising lowering the threshold in  
2 regions to which no halftone modulation has been identified based upon the first  
3 threshold.

1           10.    The method of claim 1, further comprising re-mapping image tone  
2 before halftoning.

1           11.    The method of claim 1, wherein the image comprises a plurality of  
2 image levels, and filters are applied to a single image level at a time.

1           12.    The method of claim 11, wherein the image is a grayscale image  
2 comprising multiple gray levels and filters initially are applied to a middle gray level  
3 of the image.

1           13.    The method of claim 12, wherein filters initially are applied to a 50%  
2 gray level of the image.

1           14.    The method of claim 12, wherein filters are applied to a different gray  
2 level of the image to resolve uncertainties or ambiguities, or both.

1           15.    The method of claim 1, wherein the ordered sequence of halftone  
2 modulations is identifiable without knowledge of an original image corresponding to  
3 the image before halftone modulation.

1           16.    A system for detecting information embedded in an image, comprising:  
2 a decoder configured to apply a respective filter to the image to identify an  
3 ordered sequence of two or more different halftone modulations embedded in the  
4 image for each of the halftone modulations.

1           17.    The system of claim 16, wherein each halftone modulation corresponds  
2 to a respective dither matrix and each filter corresponds to a matched filter for a  
3 respective dither matrix.

1           18.    The system of claim 16, wherein the image comprises a plurality of  
2 image levels and the decoder is configured to apply filters to a single image level at a  
3 time.

1           19.    The system of claim 18, wherein the decoder is configured to apply  
2 filters to a different gray level of the image to resolve uncertainties or ambiguities, or  
3 both.

1           20.    A computer program for detecting information embedded in an image,  
2 the computer program residing on a computer-readable medium and comprising  
3 computer-readable instructions for causing a computer to:  
4           for each of two or more different halftone modulations, applying a respective  
5 filter to the image to identify an ordered sequence of halftone modulations embedded  
6 in the image.